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# FIVE NEW MEXICAN DRAGONFLIES (ODONATA)

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In September, 1923, J. H. Williamson joined Dr. William Mann on one of the latter's field trips to Mexico. The dragonflies collected on this trip have been carefully studied, and five new species are represented by material ample to permit their description at this time. These five species belong to four genera so that uniformity of treatment was impractical; the exigencies in each case have determined the form and space given that particular description.

## **Telebasis incolumis**, new species

Abdomen male and female 23.0–24.5 mm.; hind wing male 15.0–16.0 mm., female 15.5–17.0 mm.; stigma front wing male .67–.73 mm., female .70–.80 mm.; stigma hind wing male .73–.80 mm., female .80–.88 mm.

Male. Ventral side and rear of head pale; dorsum of head in front red or reddish from about the anterior level of the ocelli; posteriorly from this line to the posterior border, black; variable pale areas about the ocelli; the red or reddish in front is brightest in the median area and the labrum is brightest and reddest.

Prothorax reddish or yellowish brown; front lobe with a dark to black median area, rounded behind, and, in front, extended on either side along the pale margined anterior border; middle lobe with a more or less distinct roughly crescent shaped or three pointed darker area on either side of the median line at about midlength; hind lobe black, narrowly pale margined on its posterior edge and widely on either side.

Thorax above red or reddish yellow and black. Middorsal carina and, to a variable extent, on either side of it, pale; on either side of this pale middorsal area a black stripe the length of the mesepisternum, variable in width, usually about half as wide as the mesepisternum, with an outwardly and downwardly directed hook more or less developed on its outer border and above its middle; sides paler, a small black spot above on the humeral suture, an elongate pestle-shaped dark spot, rarely reduced to a line or, in one male, wanting, below on the mesepimeron; a dark line above on the first lateral suture; two small black spots, one each above the mes- and metepimeron, along the upper edge of the lateroalar ridge; the poststernum tipped with black. Legs pale yellow or reddish yellow, spines, except the comb of the first tibia which is the leg color, and tips of the tarsal claws, black. Wings clear, stigma light reddish brown.

Abdomen and appendages red, brighter and darker above, the apical spines on the superior appendages and the apex of the inferiors black.

Female. Light brown or yellowish brown instead of the red or reddish of the male; as in the male, paler on the sides and below, and patterned with black except that the abdominal appendages are not black tipped. Abdominal segments 2–8 each more or less distinctly very narrowly dark ringed at apex; joined in front to these dark rings are obscure, ill-defined, rounded median spots about as long as wide, each covering about one-fifth the length of its segment, and extended on the sides about half the height of the segment. These spots are not always evident on all the ringed segments and seem to

be more evident on segments 2–5 or 6 than on the others; sometimes a narrow, longitudinal, median, dark stripe, bisected by a pale thread line, and fading out at once on either side, is evident, especially on segments 3–6.

In both sexes there are 9 or 10 postnodals in the front wing and 8 or 9 in the hind wing. The relation of the point of separation of A, from the hind margin of the wing, to Ac, using the length of Ac as the unit of measurement, based on the front and hind wings of 26 males and 8 females: A separating from the hind margin at Ac, 1 female hind wing (6%); A separating from the hind margin proximad to Ac less than the length of Ac, 5 male front wings (10%) and 2 female front wings (12%), 43 male hind wings (85%), and 10 female hind wings (60%); A separating from the hind margin proximad to Ac about the length of Ac, 15 male front wings (30%) and 7 female front wings (42%), 8 male hind wings (16%) and 5 female hind wings (30%); A separating from the hind margin proximad to Ac greater than the length of Ac, 32 male front wings (62%) and 7 female front wings (42%), 1 male hind wing (2%). Because of the size of the unit (the length of Ac) used to define the above groups the front wings (or hind wings) of any individual might both fall in the same group and yet not be symmetrical. The 26 males and 8 females were therefore checked for symmetry with the following result: front wings symmetrical, 12 males, 4 females; not symmetrical 14 males, 4 females: hind wings symmetrical 18 males, 4 females; not symmetrical 8 males, 4 females.

One male (October 6) has 9 red mites on the sterna of segments 3–5 inclusive. This specimen has the quadrangle of the left hind wing with 4 cells, and the cell posterior to it divided; there is a cubito-anal crossvein before Ac, proximal to Ac about one-third the distance to the wing base; between these two cubito-anal cross veins are two strong crossveins across the median space, the more proximal of which is just distal to the first antenodal. Another male (October 6) has abdominal segment 6 bent and twisted, due doubtless to injury at the time of emergence.

*Telebasis incolumis* is closely related to *T. salva,* and, like that species, variable in the extent and form of the few dark areas on the body to such a degree that no color differentials exist. In all the material of *incolumis* except one male the upper end of the dark stripe on the mesepimeron is on the level of or superior to the hook or widening of the dark mesepisternal area. Of a long series of *salva,* in the majority of specimens the mesepimeral stripe is shorter, and this seems especially true towards the northern part of its range, but some individuals throughout the range do not have it so shortened. And while it is entirely wanting in some *salvas,* so is it wanting in one male of *incolumis.* In the same way, in *incolumis* there is usually a distinct dark stripe above on the first lateral suture, which stripe is not widened below into a distinct spot, while in *salva* the stripe is usually less distinct, but its lower end is marked by a widening into a distinct dark spot. This character will distinguish by far the greater number of specimens but not all.

The variable color patterns above mentioned and the variation in the form of the mesepisternal dark area are probably due to environmental factors operating possibly in both larval and imaginal life. The frequent lack of symmetry in the mesepisternal dark areas shows that the development of this pigment is easily retarded, augmented, or diverted.

In profile at midheight the superior appendages of the male of *incolumis* are .267–.333 mm. in length and the inferiors exceed the superiors by .267 mm. On the mesal face the superior appendage, slightly basal to the two black apical teeth, is about .24 mm. wide and about this width is maintained throughout the length of the appendage. It is the mesal face of the superior appendage which shows the most distinctive differences between the males of *incolumis* and *salva.* In *salva* the appendage in this view is narrower throughout than in *incolumis* and basally it narrows while in *incolumis* it is of nearly uniform width. In *salva* the two black apical teeth are subequal in size, and in *incolumis* the more ventral and apical tooth is much the larger. (Compare figures 18 and 21.)

On either side of the hind lobe of the prothorax of the female of *salva* and *incolumis* is a small process or spine no trace of which exists in the males. In the female of *salva* the process is at the anterior border of the hind lobe and overhangs the middle lobe. In *incolumis* it is placed at near the midlength of the hind lobe and does not extend over the middle lobe. These spines or processes were studied on the following females of *salva*: two from Clifton, Texas; one from Round Mountain, Texas; two from Mesa, Arizona; four from Chandler, Arizona; one from Los Angeles, California; one from Los Parres, Baja California, Mexico; one from Hermosillo, Sonora, Mexico; three from Acoponeta, Nayarit, Mexico; four from near Cocula, Jalisco, Mexico; one from near Villegas, Jalisco, Mexico; three from Guadalajara, Jalisco, Mexico; eleven from the region of Lake Chapala, Jalisco, Mexico; one from Cuernavaca, Morelos, Mexico; and one from Gualan, Guatemala. In all the posterior lobe of the prothorax bears a spine on either side which extends over or above the middle lobe. It varies in shape from nearly a cone to a plate, flattened on the anterior and posterior faces, the apex acute or rounded, and from nearly erect to directed anteriorly. A single female from Palmdale, Florida, lacks the spines and two very faint prominences on the posterior lobe are wider spaced than the spines of *salva*. In the form of the inferior fork of the middorsal carina (see next paragraph) it resembles *salva* more than *incolumis*. Males from Palmdale closely resemble *salva* and, if the Florida specimens represent an undescribed third species, that species is closer to *salva* than it is to *incolumis* and closer than *incolumis* is to *salva*. A larger series from Florida than is available to us should be in hand before a definite decision in the matter is attempted. A single male (no females collected) from a small canyon in Custer County, Oklahoma, collected October 19, 1929, seems to be indistinguishable from *salva*, which species is now known from Florida, Oklahoma, Texas, Arizona, California, Mexico, Guatemala, and Panama, with the Florida identification open to question.

The inferior fork of the middorsal carina is similar in the sexes. In *salva* it is more abrupt than in *incolumis* (see figures 19 and 22). And, again in both sexes, the mesostigmal lamina is slenderer in its outer half in *salva* than it is in *incolumis*.

In view of the black leg spines, tips of tarsal claws and spines or teeth on the superior appendages of the male, it is interesting to note that in a specimen (San José de Comandu, October 10, 1923) which had lost the right front leg at the coxa, a regenerated stump, almost as long as the trochanter of the opposite leg, is shining black. A female (Los Parres, October 6, 1923) which had lost the middle right leg at the trochanter has on the apex of the trochanter a small two branched black tipped stump.

Described from 27 males and 8 females, all from Baja California, Mexico: 23 males and 5 females, October 6 and 7, 1923. Los Parres; 1 male and 1 female, October 8, 1923, Palmarita; and 2 males and 2 females, October 10, 1923, San José de Comandu; J. H. Williamson; type male and allotype female, October 10, 1923; all in collection E. B. W. We sent a male and female of *incolumis* to Dr. Calvert who reported: "I compared the female with the females standing as *salva* in the collection at the Academy but found none like it. The males I did not examine as carefully but I believe that they do not include any of your new species of *Telebasis*."

Los Parres (or Los Parras?) is a single house back in the hills four or five hours' journey by mule from Loreto, Baja California. Collecting was done along a five hundred yard stretch of mountain creek. Here a dam formed a one hundred and fifty foot pool. Above the pool the bed of the creek was dry. Below the dam there were little pools of water among the rocks for a few hundred yards down the canyon. Water from the pool was used for irrigating grapes, olives, oranges, date palms, etc. Associated with *incolumis* at Los Parres were *Archilestes californica, Argia agrioides, Heliargia vivida, Chalcargia tezpi, Telebasis salva, Enallagma eiseni, Ischnura cervula, Erpetogomphus natrix, Anax walsinghami*

and *junius, Aeshna multicolor, dugesi,* and *manni, Coryphaeschna luteipennis, Orthemis ferruginea, Libellula saturata, Micrathyria hageni, Pseudoleon superbus, Pachydiplax longipennis, Erythrodiplax abjecta, Erythemis collocata, Paltothemis lineatipes,* and *Tramea onusta.*

Palmarita is a one house settlement about one day's mule journey from Los Parres. Here a tiny trickle of water ran for about fifteen feet in a creek bed, then formed a pool about two feet in diameter, dug out to obtain drinking water; then a slightly larger pool for washing clothes, and, below this, a small swampy area filled with dead fronds from a cluster of date palms. Collecting was done here only from about five p.m. until dusk. Associated with *incolumis* were *Heliargia vivida, Anax junius, Aeshna manni, Orthemis ferruginea, Libellula saturata, Perithemis intensa, Pseudoleon superbus, Erythrodiplax abjecta,* and *Dythemis nigrescens.*

About eight hours' journey by mule, still inland from Palmarita, is San José de Comandu. Here are two villages in the cultivated valley of the Arroyo de Comandu. Irrigation ditches on either side of the creek contain water throughout the year and pass through plantings of date palms, corn, beans, sugar cane, and oranges. Collections were made up stream and along the ditches for about three kilometers to the source of the water—a gushing spring or outlet of an underground stream in the boulder strewn bed of the creek. Associated with *incolumis* were *Hetaerina americana, Archilestes californica, Argia agrioides, Heliargia vivida, Chalcargia oenea* and *tezpi, Telebasis salva, Ischnura cervula, Erpetogomphus coluber* and *natrix, Anax walsinghami, Coryphaeschna luteipennis, Libellula saturata,* and *Sympetrum corruptum.*

### **Neoerythromma gladiolatum,** new species

Abdomen male 23.0–24.5 mm.; hind wing male 15.5–16.0 mm.; stigma front wing male .67 mm.; stigma hind wing .73–.80 mm.

Similar to the hitherto single known species, the genoholotype, *Enallagma cultellatum* Hagen. *Gladiolatum* is a more robust, slightly larger species, with the blue of the thorax, especially the antehumeral stripes, a bright sky-blue, not tinged with yellowish as in *cultellatum.* In specific details the males of the two species (the female of *gladiolatum* is not known) differ as follows. (In each species, as might be expected, there are numerous color pattern variations. These have been taken into account and the differences here noted are believed to be of specific value). In *cultellatum* the anterior border of the mesostigmal lamina is more concave and the outer half is therefore narrower than in *gladiolatum.* In *cultellatum* the roughly quadrate basal black spot on the dorsum of abdominal segment 1 is straight edged posteriorly or with the latero-posterior angles produced posteriorly; in *gladiolatum* the posterior edge is convex without any trace of latero-posterior extensions. In *cultellatum* on 2 the black area reaches from the apex to about the middle of the segment and has on each side a latero-anterior extension to or nearly to the base of the segment; in *gladiolatum* there is a roughly quadrate dorsal spot with its anterior edge not reaching the middle of the segment and with a median stem posteriorly which joins it to the black of the posterior membrane which encircles the segment. In *cultellatum* the dorsal black on 3 is relatively wide, and covers the entire dorsum except for a narrowly interrupted basal blue ring, the ring covering less than one-eighth of the segment; in *gladiolatum* the dorsal black is relatively narrow and the basal blue is not interrupted in the median line and covers one-fourth to three-eighths of the segment. In *cultellatum* the basal blue ring on 4 is narrowly divided and covers about one-fifteenth the length; in *gladiolatum* it is also divided but covers slightly in excess of one-ninth the length. On 4–6 the black on the dorsum is relatively wider in *cultellatum* than in *gladiolatum.* The basal rings on 5 and 6 are narrower in *cultellatum* and, as on 3 and 4, are more or less emarginate at mid-heighth on their

posterior border by a slight anteriorly directed extension of black; in *gladiolatum* the rings are wider and, on 4–6, the posterior border is entire, the black passing, from its ventro-anterior angle, dorso-anteriorly in a smooth line. In *cultellatum* the pale basal ring on 7 is greatly reduced and the entire dorsum is black except the posterior membrane which is blue, anteriorly the black extends on the sides for about three-fourths the height, decreasing in width posteriorly to about one-half the height at the apex; in *gladiolatum* also, the pale basal ring is greatly reduced but the apical half or more of the dorsum is blue, the dorsal basal black reduced in width to a maximum of less than two-thirds the height of the segment; on either side the ventro-posterior angle produced posteriorly in a roughly triangular extension varying in length from one-sixth to one-tenth the length of the segment. The color patterns of 7 will be the most useful character in separating these two species in the field and should permit of their recognition before capture—dorsum of 7 all black in *cultellatum,* apical half blue in *gladiolatum.*

The following notes on the living colors were made: top of head black; postocular spots blue; eyes black above, greenish below; face golden; lower lip yellow; abdomen blue and black.

The differences in the abdominal appendages of the two species are conspicuous. In *cultellatum* the inferiors are reduced in size and probably in function as grasping organs, being weakly chitinized and more or less flexible. The superiors on the other hand owe their great length and breadth to the great development of a much less developed part of the appendage in *gladiolatum* in which latter species the inferiors are well developed and both superiors and inferiors function in the more usual manner as grasping organs. In figure 14, showing the mesal face of the superior appendage of *gladiolatum,* the ovate area at the left of the figure is excavated or cupped on the mesal face. It is bounded above (the cylindrical part at the right of figure 14) by a highly chitinized and thicker part, only a little longer than the inferior cupped area.

In *cultellatum* this thicker part of the appendage of *gladiolatum* becomes the long flattened and most conspicuous and distinctive part of the superior appendage. At the base and below this expanded part of the appendage is the cupped area, described above in *gladiolatum,* which, in *cultellatum,* is about one-third the length of the appendage and is a little longer and a little narrower than in *gladiolatum.* One of Kennedy's characters for the genus was "male appendages resembling those in *Enallagma signatum.*" This is not true of *gladiolatum,* and the resemblance between *cultellatum* and *signatum* is only superficial.

The following notes on venational characters refer only to *gladiolatum.* The measurements of stigmas include the enclosing veins; those of the quadrangles do not include the enclosing veins but are of the space enclosed. Measurements are in the following order: proximal, anterior, distal, posterior. Stigma front wing .53 mm., .67 mm., .46–.53 mm., .60–.67 mm.; hind wing .46–.53 mm., .73–.80 mm., .53 mm., .62–.73 mm. Quadrangle front wing .22–.27 mm., .20 mm., .67–.80 mm., .86–.93 mm.; hind wing .27 mm., .33–.40 mm., .67–.71 mm., 1.00–1.07 mm. Ac in front and hind wings distal to the level of the first antenodal .06–.13 mm. Postnodals front wing 8 (9 in one wing); hind wing 7 (6 in two wings). In front wing A separating from hind margin proximad to Ac a distance equal to, to twice as long as, Ac in all 6 wings; in 4 of the 6 wings a distance slightly greater than Ac: in hind wing A separating from hind margin proximad to Ac a distance from slightly shorter than, to slightly longer than, Ac in all 6 wings; in 3 of the 6 wings a distance slightly greater than Ac. $M_2$ in front wing arising at or near the fourth postnodal; in hind wing at or near the third postnodal. $M_{1a}$ in front wing arising at the seventh postnodal; in hind wing at the sixth postnodal. $M_3$ in front wing terminating at the level of the middle of the stigma; in hind wing at the level of the distal angle of the stigma. $Cu_1$ in front wing terminating at the level of from midway between the fourth and fifth post-

nodals to midway between the fifth and sixth postnodals; in hind wing at the level of the fifth postnodal.

Described from 3 males, November 1 and 2, 1923, Acoponeta, Nayarit, Mexico, J. H. Williamson, type male, November 1; all in collection E. B. W. A male was examined by Dr. Calvert who writes "species unknown to me."

Acoponeta is only slightly above sea-level. The Rio Acoponeta was about two hundred feet wide here and too deep to ford except at widely separated places. Generally the bed is wide and stony with no vegetation near the stream. Occasionally bushes and trees overhung the banks, and sometimes near the stream bed were more or less swampy areas where seepage water collected and where dragonflies were more abundant than on the barren stretches of the river. About a mile and a half below town an island fifty feet wide and several hundred yards long, with willow-like bushes which overhung the water, divided the river into two channels. *Gladiolatum* was found about the swampy areas and in the vicinity of the island. In association with it were *Hetaerina titia, Chalcargia pulla* and *tezpi, Enallagma caecum, Ischnura ramburii, Erpetogomphus viperinus, Orthemis ferruginea, Micrathyria aequalis, Erythrodiplax abjecta, Lepthemis vesiculosa, Pseudoleon superbus, Dythemis nigrescens,* and *Macrothemis inacuta.*

## The Species of Erpetogomphus

*Erpetogomphus menetriesii* Selys is an indeterminate species which was described in 1850 from a single incomplete male labelled from Brazil. Later de Selys decided it was probably not distinct from *crotalinus.* The accuracy of the label is open to question, the specimen has been lost, the description is inadequate, and no other material has been identified as this species. There remain sixteen species of *Erpetogomphus* which are probably good. Briefly considered alphabetically they are: *E. boa* Selys. Described from (apparently) a single male and female from Vera Cruz, Mexico.

Calvert (*B. C. A.*) thinks the female is really *crotalinus*. And under *sipedon* he says, "It is possible these females may be *E. boa* but the description of that species is too brief to enable a decision to be reached." Later (p. 399), referring to his figures 53 and 54, plate 10, of the type male, he says, "*E. boa,* in the light of these figures and the description seems hardly different from *E. elaps.*" This is one of the five species of Central American dragonflies not seen by Dr. Calvert (*Science,* 1908). The type male has the apex of the superior appendages broken off before the apex of the inferior appendage. Ris (1917) describes and figures a male in the Hamburg Museum, lacking definite locality, which has the apex of the inferior appendage broken off. Its identity with *boa* is very probable and it is distinct from *elaps*. At present the species is represented in collections by two broken males which have not been directly compared. *E. compositus* Hagen. Originally described from a single female from the Pecos River in western Texas. The male was later described from a specimen from Oregon. It is now well known from Wyoming, Oregon, Nevada, California, Arizona, New Mexico, Texas, and Mexico. Both sexes in collection E. B. W. *E. cophias* Selys. Described originally from a single male from Mexico and later from a single female also from Mexico. Calvert (*B. C. A.*) studied new material consisting of four males and four females, all from Mexico. Only these ten specimens are known. Two females in collection E. B. W. *E. crotalinus* Hagen. Described from both sexes from Mexico. Well known, all captures in Mexico. Both sexes in collection E. B. W. *E. constrictor* Ris. Known only from the original material, three males and one female, from Vera Cruz, Mexico. Related to *E. tristani* from Costa Rica and *E. sabaleticus* from Colombia and Venezuela. Not represented in collection E. B. W. *E. designatus* Hagen. Described from several specimens, both sexes, from the Pecos River in western Texas. A well-known, widely distributed species, occurring in Florida, Maryland, Ohio, Indiana, Tennessee, Arkansas, Missouri,

Kansas, Texas, and Mexico. A series covering the range should be assembled and studied for possible specific differences. Both sexes in collection E. B. W. *E. diadophis* Calvert. Described from two females from Texas. Later (1919) Calvert figured the Texas paratype and compared it with a teneral Guatemalan female, doubtfully referred to *diadophis.* No other specimens known and not in collection E. B. W. *E. elaps* Selys. Originally described from a single male from Mexico. Later described by de Selys from a larger series, including both sexes, from Mexico. A well-known species from Mexico, Guatemala, and Costa Rica. Both sexes in collection E. B. W. *E. eutania* Calvert. Described from a single male from Mexico, not collected since and not in collection E. B. W. *E. lampropeltis* Kennedy. Both sexes described from specimens collected in California; related to *designatus.* Males in collection E. B. W. *E. ophibolus* Calvert. Described from two males from Mexico; no other captures; resembles *constrictor* in the form of superior appendages. Not in collection E. B. W. *E. sabaleticus* Williamson. Described from a single male and female from Colombia. Later three males were taken in Venezuela. It is closely related to *tristani,* the females apparently indistinguishable, and is the only species of the genus known from South America. Type male and allotype female in collection E. B. W. *E. schausi* Calvert. Known only from the single male type from Guatemala and not represented in collection E. B. W. *E. sipedon* Calvert. Described from six females, not certainly con-specific, from Mexico. Later a female in bad condition from Mexico was referred to this species by Calvert. In the original description Calvert says it is possible the specimens should be referred to *boa,* the description of *boa* being inadequate. Two females in collection E. B. W. *E. tristani* Calvert. Described from a male and female from Costa Rica. Later Professor Tristán obtained a second male and Dr. Ris received a male and female from Panama. *Tristani* was the first of the three related peculiar species, *tristani,*

*constrictor,* and *sabaleticus,* to be described. One male in collection E. B. W. *E. viperinus* Selys. Described from both sexes from Mexico and since taken a number of times in Mexico and Guatemala. Both sexes in collection E. B. W. To these sixteen described species we are adding two in this paper bringing the total number of Erpetogomphi up to eighteen. Both these new ones have been taken only in Baja California, and it is a surprising fact that they are the first record for the genus in that Mexican state. The specific names of the two new species were suggested by Dr. A. G. Ruthven and are a continuation of the ophidian example set by de Selys and Hagen and continued by Calvert, Ris, and Kennedy.

### **Erpetogomphus coluber,** new species

Abdomen male 32–33 mm.; hind wing male 24–26 mm.; stigma front wing male 2.67 mm.; stigma hind wing male 2.75–3.00 mm.; hind femur on upper surface male 5 mm.; superior appendage of male in dorsal view 2.09 mm.

Male. Head and thorax pale grayish green, brighter and less gray on the sides of the thorax, with the following dark brown: base of labrum narrowly and a median projection extending half-way across the labrum to form a median spot; a transverse streak below on either side of the anteclypeus; a transverse bar below on the frons along the fronto-clypeal suture, produced backward on either side to the eye; a fainter tinging on the postclypeus along its posterior border; vertex black; a posterior edge next the eye on either side of the occiput; rear of head black; the dark markings on the labrum and frons are variable and in some specimens are faint to the point of disappearance; prothorax except a spot or border in front and three spots behind; the anterior mesothoracic area except along the anterior transverse carina which is pale, narrowly divided in the median line; a middorsal wedge-shaped mesepisternal area, twice as wide below as above, not reaching the anterior transverse carina except very narrowly in the median line, confluent above with a dark border which occu-

pies the antealar and lateroalar carinas; an antehumeral and humeral stripe, the first continuous or not with the brown of the antealar carina, the second continuous with the brown of the lateroalar carina, both confluent below with the dark color of the mesinfraepisternum; the two stripes separate or joined near their upper ends, the included pale area varying from a stripe about as wide as the humeral stripe to a narrow line below and a rounded spot above; a stripe on the first and on the second lateral sutures, both connected above with the brown of the lateroalar carina, the first connected below with the humeral dark stripe, the second turned backward below for a distance of a little more than one mm. along and beneath the latero-ventral margin; these two lateral stripes separate or, at about midheight, joined so that the included pale area varies from a stripe wider than the dark second lateral stripe to a long spot above and a shorter spot below.

Abdomen brown and black, marked grayish green on segment 1 and the sides of 2, and yellow (so interpreted from dried material) on the dorsum of 2 and on succeeding segments, becoming reddish yellow on the last four segments; 1 obscurely patterned, mostly pale above except the base, colors palest and clearest on the sides below; 2 with a broadly U-shaped bar below on the side, the anterior branch covering the auricle; 2–6 each with a longitudinal median dorsal stripe, these stripes progressively reduced posteriorly, variable, in no case reaching the apex of a segment, and sometimes scarcely discernible on 6; on 3 this dorsal stripe widens rapidly at the base and extends onto the sides; on 4–6 the stripes are joined with transverse basal yellow rings which more or less encircle each segment and are one-fourth to one-seventh its length; 7–10 deeper yellow or orange, the basal half of 7, apical half of 10, except the extreme apex of 10 which is narrowly black above and a spot on either side, and the sides of all clear in color, the remainder of the dorsa variously darkened to black, in the darkest specimens with the dark extending on the sides to or below midheight, this lateral extension most marked on 7.

Superior appendages yellow, inferior slightly darker and reddish.

Wings with venation and stigmas black; costas narrowly grayish green; wings clear or with the faintest tinge of tawny at the extreme base. Stigma of front wing surmounting 2 cells (1 wing—5%), 2½ cells (3 wings—15%), 3 cells (8 wings—40%), or 3½ cells (8 wings—40%); of hind wing 2½ cells (6 wings—30%), 3 cells (7 wings—35%), or 3½ cells (7 wings—35%); antenodals of front wing 11 (9 wings—45%) or 12 (11 wings—55%) [in *compositus* 10 (1 wing—5%), 11 (5 wings—25%), 12 (6 wings—30%) or 13 (8 wings—40%)]; of hind wing 7 (2 wings—10%), 8 (11 wings—55%), or 9 (7 wings—35%) [in *compositus* 7 (1 wing—5%), 8 (4 wings—20%), 9 (8 wings—40%), 10 (6 wings—30%), or 11 (1 wing—5%)]; postnodals of front wing 6 (3 wings—15%), 7 (12 wings—60%), or 8 (5 wings—25%) [in *compositus* 6 (1 wing—5%), 7 (7 wings—35%), 8 (7 wings—35%), or 9 (5 wings—25%)]; of hind wing 7 (2 wings—10%), 8 (14 wings—70%), or 9 (4 wings—20%) [in *compositus* 7 (3 wings—15%), 8 (6 wings—30%), 9 (8 wings—40%), or 10 (3 wings—15%)]; anterior cell of anal triangle not divided into two cells, only two large cells in the anal triangle and rarely additional very small cells, 15 wings—75%; anterior cell of anal triangle divided into two cells, three large cells in the anal triangle and rarely additional very small cells, 5 wings—25% [in *compositus,* 20 wings—100%]; maximum number of rows of cells posterior to A in front wing from wing base to level of posterior angle of triangle, 1 in 20 wings—100% [in *compositus,* 2 in 20 wings—100%, and in examining 34 more wings of *coluber* we found 8 wings which had a single row of 2 cells just distal to Ca]; number of cells in the first row of postanal cells, 1 (6 wings—30%) or 2 (14 wings 70%) [in *compositus* 1 (1 wing—5%), 2 (18 wings—90%), or 3 (1 wing—5%)]; total number of postanal cells 4 (1 wing—5%), 5 (3 wings—15%), 6 (6 wings—30%), 7 (8 wings—40%) or 8 (2 wings—10%)

[in *compositus* 7 (4 wings—20%), 8 (10 wings—50%), 9 (5 wings—25%) or 10 (1 wing—5%)]; number of rows of cells posterior to $Cu_2$ in front wing at about midlength of the wing, 2 (9 wings—45%), or 3 (11 wings—55%) [in *compositus,* 3 (20 wings—100%)]; number of rows of cells posterior to $Cu_2$ in hind wing posterior to triangle, 3 (18 wings—90%), or 4 (2 wings—10%) [in *compositus* 3 (7 wings—35%), or 4 (13 wings—65%)].

Coxae and trochanters pale, legs black, anterior face of femora pale nearly or quite to the apex.

Female not known.

Described from 31 males all taken at San José de Comandu, Baja California, Mexico, October 10, 1923; J. H. Williamson; type male one of this series; all in collection E. B. W. For further details of the location of San José de Comandu, and the conditions, and the dragonflies collected here, see page 7, under *Telebasis incolumis. Erpetogomphus coluber* was common along a grassy banked irrigation ditch with sides about three feet high.

The penis of *coluber* is essentially like that of *natrix* (see figure 6) except differences in the apical branches of the fourth segment (compare figures 11 and 13), and it is still more like that of *compositus* where the differences in the apical branches are slight (compare figures 11 and 12). Specific differences in penes of Erpetogomphi are probably confined to the fourth segment and particularly to the laterodorsal midlength spine or plate (which certainly has specific characters or is widely variable within a species) and to the apical branches. The small apically directed spine or projection on the second segment lies in the median line in close proximity and basad to the opening in the apex of that segment. It is widely distributed in Anisoptera and probably has some mechanical function either in the transfer of seminal fluid to the penis or in copulation.

On the superior abdominal appendage is a basal dorsal spine, tubercle or transverse ridge, which is associated with

various modifications, often of a specific character, of the posterior border of the tergum of segment 10. This correlation of parts is also widely distributed in Anisoptera, and the same function is implied wherever it occurs. These structures limit definitely the elevation of the apex of the appendage thus, in collaboration with the inferior appendage, insuring pressure or even locking of the appendages when they are forced onto the female's head.

In Calvert's key (*B. C. A.*) to species of *Erpetogomphus, coluber* will run to AA, page 160, and, if the individual be one with the facial dark markings reduced, it will run to H, *compositus*. Drs. Calvert and Kennedy regard *coluber* as distinct from any described species. Two males were examined by Dr. Calvert, who commented as follows: "No special reason for thinking it *diadophis*; like a small *compositus*; differs in size; has broader metepisternal dark stripe; brown on 3–7 more extended; brown on 8–10 much darker; darker lines or stripes on the fronto-clypeal and clypeo-labral sutures." An examination of the entire series of thirty-one males shows that not all these characters are constant. The face markings are very pronounced in some and scarcely discernible in others; there is considerable variation in the extent of the dark thoracic markings and this variation occurs independently on the mesepisternum and metepisternum, so an individual may have the dark humeral and antehumeral relatively extensive and the two dark lateral stripes relatively reduced or *vice versa*. If the presence or development of these dark markings varies in other species as much as it does in *coluber*, descriptions of species based on half a dozen or fewer specimens must be used with caution. It must not be overlooked that the present material, from which *coluber* is described, all came from one locality, collected on a single day. *Compositus* is certainly its closest relative and the derivation of *coluber* from *compositus*, through geographical isolation in Baja California, is almost certain and is a case exactly parallel, so far as speciation goes, to that of certain species, of several genera,

endemic in Florida. *Coluber* is separated from *compositus* by its darker color, especially of the last four abdominal segments and by venational characters, especially the two-celled anal triangle and the single row of cells posterior to A in the front wing.

### **Erpetogomphus natrix,** new species

Abdomen male 35.0–38.0 mm., female 35.0 mm.; hind wing male 27.0–30.5 mm., female 30.0–31.0 mm.; stigma front wing male 2.95–3.43 mm., female 3.30–3.62 mm.; stigma hind wing male 3.14–3.62 mm., female 3.57–3.90 mm.; hind femur on upper surface male 5.90–6.30 mm., female 5.43–5.52 mm.; length of superior appendages of male in dorsal view 2.00–2.19 mm.

Male. Head and thorax light bluish green, paler on the head and fading out on the face below the frons to light yellowish on the labrum, with the following dark brown: base of labrum narrowly; a transverse bar below on the frons along the fronto-clypeal suture, sometimes pale, produced backward on either side to the eye; vertex black, occiput light brown, black edged behind; rear of head black; prothorax, except an anterior and posterior pale margin; the anterior mesothoracic area except a broad posterior margin along the pale anterior transverse carina, which pale margin is divided very narrowly in the median line; a middorsal wedge-shaped mesepisternal area, twice as wide below as above, narrowly separated from the pale anterior transverse carina except very narrowly in the median line, confluent above with a dark border which occupies the ante- and lateroalar carinas; an antehumeral and humeral stripe, the first narrowly separated above from the brown of the antealar carina, and joined narrowly or broadly above, but not below with the humeral stripe which is joined above with the brown of the lateroalar carina; the antehumeral pale stripe between them is thus more or less widely divided above into a superior spot and an inferior stripe which vary in size and width; a stripe on the first and second lateral sutures, each meeting the brown of the lateroalar carina above,

below the first stripe extends to but not onto the third coxa in front and the second stripe to the third coxa behind; a variable supero-posterior widening of the first stripe more or less constricts the pale area between the two stripes into a rounded area above joined with a longer area below.

Abdomen with segment 1 and sides of 2 light brown, marked light bluish green; dorsum of 2 and 3–6 black, marked with yellow (so interpreted from dried material); basal half of 7, yellow; apical half and 8–10, vivid reddish yellow, paling to yellow near the apex of 10, where the extreme posterior edge is black; 1 with an apical dorsal area and a large postero-inferior triangular pale area; 2 with a dorsal yellow stripe bordered with black and a broadly U-shaped bar below on the side, the anterior branch covering the auricle; 3–6 each with a longitudinal middorsal pale stripe, not reaching the apex on any, widened at about midlength on each, and, progressively from 3–6, narrowed and shortened; on 3 this dorsal stripe basally spreads over the sides and joins below along the side of the segment with a lateral extension and expansion of the midlength widening of the longitudinal middorsal stripe; 4–6 with basal yellow rings, joined with the longitudinal middorsal stripe on each segment, each ring about one-fourth the length of its segment; at midlength on 4 a narrow transverse ring joined above with the widened part of the longitudinal middorsal stripe and below with a short yellow spot or stripe on the ventral margin, this pattern homologous with the more extensive lateral yellow on 3 and with progressively reduced areas on 5 and 6, where, in the case of 6, it may disappear entirely; dorsum of apical half of 7 and of 8–10, except the distal part of 10, darkened in varying degrees in an intricate and ill-defined pattern with very dark brown and black, darkest in the middorsal region, the sides paler and clearer. Superior appendages yellow, inferior darker and reddish.

Wings with venation and stigmas black; costas very narrowly grayish green or yellow; wings clear or with a faint tinge of tawny at the extreme base. Stigma of front wing surmounting 3¼ cells (1 wing—5%), 3½ cells (4 wings—20%),

$3\frac{2}{3}$ cells (4 wings—20%), $3\frac{3}{4}$ cells (1 wing—5%), 4 cells (4 wings—20%) [females—2 wings—50%], $4\frac{1}{3}$ cells (1 wing 5%), $4\frac{1}{2}$ cells (3 wings—15%) [females—1 wing—25%], 5 cells (1 wing—5%), [$5\frac{1}{3}$ cells, females—1 wing—25%], or $5\frac{1}{2}$ cells (1 wing—5%); of hind wing $3\frac{1}{2}$ cells (3 wings—15%), $3\frac{2}{3}$ cells (2 wings—10%), $3\frac{3}{4}$ cells (2 wings—10%), 4 cells (8 wings—40%), [$4\frac{1}{3}$ cells, females—1 wing—25%], $4\frac{1}{2}$ cells (2 wings—10%), $4\frac{2}{3}$ cells (1 wing—5%), 5 cells (1 wing—5%) [females—2 wings—50%], or $5\frac{1}{2}$ cells (1 wing—5%) [females—1 wing—25%]; antenodals of front wing 11 (2 wings—10%), 12 (5 wings—25%), 13 (10 wings—50%) [females—3 wings—75%], 14 (2 wings—10%) [females—1 wing—25%], or 15 (1 wing—5%); of hind wing 8 (4 wings—20%), 9 (9 wings—45%) [females—2 wings—50%], or 10 (7 wings—35%) [females—2 wings—50%]; postnodals of front wing 7 (1 wing—5%) [females—2 wings—50%], 8 (8 wings—40%) [females—1 wing—25%], 9 (9 wings—45%) [females 1 wing—25%], or 10 (2 wings—10%); of hind wing 8 (1 wing—5%), 9 (7 wings—35%) [females—2 wings—50%]; 10 (10 wings—50%) [females—2 wings—50%], or 11 (2 wings—10%); anterior cell of anal triangle divided into two cells, three large cells and one small one in the anal triangle, 12 wings—60%; small cell not present, 8 wings—40%; one row of cells posterior to A in front wing, 5 wings—25% [females—2 wings—50%]; one double cell in the row of cells posterior to A in front wing, 12 wings—60% [females—2 wings—50%]; two double cells, 3 wings—15%; number of cells in the first row of postanal cells, 2 (20 wings—100%) [females—4 wings—100%]; total number of postanal cells 7 (1 wing—5%), 8 (12 wings—60%) [females—4 wings—100%], 9 (6 wings—30%), or 10 (1 wing—5%); number of rows of cells posterior to $Cu_2$ in front wing at about midlength of the wing, 3 (20 wings—100%) [females—2 wings—50%], or 4 [females—2 wings—50%]; number of rows of cells posterior to $Cu_2$ in hind wing posterior to or slightly distal to triangle, 4 (20 wings—100%) [females—1 wing—25%], or 5 [females—3 wings—75%].

Coxae and trochanters pale, legs black, inferior surface and anterior face of femora pale, the anterior pale area widest at the base and disappearing just before or at the apex.

Female. Similar to the male. Head and thorax apparently as bright as in the male, the brown areas on the meso- and metathorax scarcely, if any, reduced in extent.

Abdomen paler than in the male; the first three segments with the pattern essentially similar but the brown lighter in color, the pattern not as well defined, and the pale areas slightly more extensive; 4–6 each with the middorsal median spot large and narrowly joined near its middle with a large inferior lateral spot; basal half or slightly more of 7, pale; dorsum of apical part of 7 and of dorsum of 8 and 9 and sometimes of 10, dark to black, pattern of dorsum and sides of these segments obscure or wanting, evidently more subject to postmortem changes than other parts of the female or any part of the male.

Wings as in the male except that the stigma is brown rather than black. For venational characters of the female see under description of the male, page 20.

Legs as in the male except that the femora are largely pale; on the third femora the upper surface of the apical half or less is black with a median dark line to the base and a less pronounced and shorter line on either side of the median dark line; this apical black and the lines are progressively strengthened from the third to the first femora so the upper surface of the first femora is largely dark.

Described from 21 males and 2 females, all from Baja California, Mexico; 4 males and 2 females, October 6 and 7, 1923, Los Parres; 1 male, October 10, 1923, San José de Comandu; and 16 males, October 12 and 13, 1923, Purissima; J. H. Williamson; type male, October 12, and allotype female, October 6, 1923; all in collection E. B. W. For further details of the location of Los Parres and San José de Comandu and the conditions and the dragonflies collected at each of these stations see page 6 and page 7 under *Telebasis incolumnis*. Purissima is about one day's mule journey from

San José de Comandu and is west of the mountains, in the Rio Purissima valley. The Rio Purissima at this season was of a varied character. There was a wide deep pool above a dam; at other places the stream flowed over rock or sand; there were marshy expansions; and at some points the stream bed was dry. Associated with *E. natrix* along this stream were *Hetaerina americana, Archilestes californica, Argia agrioides, Chalargia oenea and tezpi, Ischnura cervula, Progomphus borealis, Anax junius* and *walsinghami, Aeshna multicolor, Orthemis ferruginea, Libellula saturata, Pseudoleon superbus, Sympetrum corruptum, Erythemis collocata, Pachydiplax longipennis, Brachymesia furcata, Erythrodiplax abjecta, Dythemis nigrescens, Paltothemis lineatipes,* and *Pantala hymenaea.*

The following brief color description was made from a freshly killed male, Purissima, October 13: "Eyes bluish gray; face light green, slightly paler below. Thorax light pale green with brown stripes. Abdomen black with pale greenish markings, especially on dorsum of 2, becoming lighter progressively toward apex of abdomen as far as basal half of 7; apical half of 7 and 8–10 light and dark brown; appendages light brown, almost yellow." The abdominal pale markings noted above as green are distinctly yellow in preserved material and the last three and one half segments are a vivid brown. The thoracic green has a more distinct bluish cast than we have seen in any other species. Envelopes in which males are papered bear the following notes: Los Parres, October 6, "alighted on rocks"; Purissima, October 12, "alighted on rocks, sand, and branches." A male, Purissima, October 12, has the stigma of the right front wing pierced by a very slender cactus (?) spine 3 mm. long.

In the female of *Erpetogomphus natrix* the sternum of the eighth abdominal segment is highly modified into a relatively large and thickened, roughly quadrangular plate, terminating apically in two plates, the vulvar lamina, each also roughly quadrangular in shape. Just anterior to these plates the sternum is produced ventrally into a median prominence

which is formed by the inner angle of each of the two plates of the vulvar lamina and by one or two folds on each side of the sternum just anterior to the vulvar lamina. In figure 15, four folds, two on either side, are shown, all converging at the median line with the inner angles of the two plates of the vulvar lamina to form the median prominence. Anterior to this prominence is a still more elevated elliptical transverse prominence. Just posterior to the vulvar lamina in the median line the sternum of segment 9 is modified into a short highly chitinized egg pocket or receptacle. Each half of the vulvar lamina is folded or turned slightly dorsad so the lamina covers and encloses the basal part of the egg pocket. There may be some slight movement of the vulvar lamina possible along the basal edge, permitting of a raising and lowering of the two quadrangular plates, but even such limited motion may not be possible between any parts of the sternum. Compression or inflation of segment 8 might lift the vulvar lamina from the egg pocket. Or, if segment 9 were elevated dorsad, forming an angle with segment 8, the same uncovering of the egg pocket would take place. It is probable that the ovipositing female in full flight, dashing the tip of the abdomen through the water, pushes back segment 9 on segment 8, and that this habit of ovipositing results not only in the washing of the eggs into the water but may have something to do with the extrusion of the egg.

*E. crotalinus, designatus, natrix,* and *lampropeltis* form a natural group, based on the form of the male abdominal appendages, progressing in extent of dark thoracic markings from least to most in the order named. The males may be briefly distinguished as follows. The unmarked thorax and supero-lateral longitudinal black bars, definitely patterned, on 7–9 at once separate *crotalinus* from the other three. The rear of the head and femora of *crotalinus* and *designatus* are paler than in the other two and, while *designatus* has definite dark thoracic markings, its abdomen is paler, at least as regards most of the segments, than is that of *crotalinus.* The median occipital swelling of *designatus* separates it from all

the others. *Designatus* is also separated from *natrix* and *lampropeltis* by having the pale antehumeral stripe wider than the dark humeral, and by the absence of two complete lateral dark stripes. *Lampropeltis* and *natrix* are closely related. Kennedy's description of the male of *lampropeltis,* based on the type alone, does not indicate the wide variation in color pattern which this species apparently shares with *natrix.* Moreover, his figure of the abdominal appendages in profile shows the superior angulation of the superior appendage at about three-fifths the length of the superior instead of at about five-sevenths, subject to some variation, as it is in both *lampropeltis* and *natrix* in the material available to us. In *natrix,* if not in both species, the dorsal edge of the superior, distal to the angulation, varies from almost straight to distinctly concave. In this maze of variations specific characters are not readily detected. The head and thorax of *lampropeltis* are duller and paler than in *natrix.* For example, the rear of the head is brown in *lampropeltis* and black in *natrix;* the thoracic brown is paler in *lampropeltis* and the pale areas are grayer, giving much less contrast in the thoracic pattern; the two lateral dark stripes are always joined, often very broadly in *lampropeltis,* and are not joined in any specimen of *natrix* we have seen; the femora are brown in *lampropeltis* where they are black in *natrix;* and the inferior dilated edge of abdominal segments 8 and 9 is black in *lampropeltis* and, in *natrix,* is colored light vivid brown like the sides of the segment adjacent to the edge. In Calvert's key to females of *Erpetogomphus* (*B. C. A.*), *natrix* will run out to his *sipedon* form *a* except that the dark submedian thoracic stripes, wanting in *sipedon* form *a,* are present in *natrix.* It is probable that *sipedon* will be found to be another member of the group comprising *crotalinus, designatus, natrix,* and *lampropeltis.* From *crotalinus, sipedon,* and *designatus, natrix* is separated at once by the rear of the head being black and by the more extensive dark thoracic markings. As in the male, so in the female, the median occipital swelling of *designatus* also separates it from its allies. We are unable to

compare female specimens of *lampropeltis* and *natrix*. It is probable the thoracic markings which separate the males will also hold good for the females. To judge by Kennedy's figure and description the vulvar lamina is longer in *lampropeltis* than in *natrix*, and we venture the guess which we hope will not be considered too hazardous, that the lateral lobes of *lampropeltis* will be found to be quadrangular as they are in *natrix* and not triangular as described. Drs. Calvert and Kennedy regard *natrix* as distinct from any described species. A male and female were studied by Dr. Calvert and his comments follow: "First hamules male apparently a little wider in distal half than they are in *crotalinus*. Female differs from Guadalajara female of *sipedon* form *a* in frons more deeply concave sagitally, general size larger, presence of two lateral thoracic brown stripes, black on third femora more extended."

**Aeshna manni,** new species

Abdomen male 42–45 mm. + appendages 6 mm.; female 44 mm. + appendages, broken off at 7 mm., estimated 10 mm.; hind wing male 43–45 mm.; female 45 mm.; stigma front wing male 2.95–3.20 mm., female 3.33 mm.; stigma hind wing male 2.75–2.90 mm., female 3.00 mm.; third femur on upper surface male 7.27 mm., female 6.82 mm.; width of head male 9 mm., female 9.5 mm.; width of frons male 4.5 mm., female 4.7 mm.; maximum width of thorax male 7.3 mm., female 7.6 mm.; maximum width of abdominal segment 2 male 5.0 mm., female 5.2 mm., maximum depth of segment 2 male 5.7 mm., female 5.2 mm.; width at base of segment 3 male 3.0 mm., female 2.9 mm.; width at apex of segment 3 male 2.4 mm., female 2.4 mm., minimum width of segment 3 male 1.7 mm., female 1.9 mm.; depth at base of segment 3 male 3.3 mm., female 3.8 mm.; depth at apex of segment 3 male 2.4 mm., female 3.0 mm.; minimum depth of segment 3 male 2.0 mm., female 3.0 mm.; width at apex of segment 4 male 2.5 mm., female 2.4 mm.; depth at apex of segment 4 male 2.4 mm., female 3.0 mm.

Male. Labium with median and lateral lobes bluish gray colored, mentum and squames light yellowish brown; face blue, paler along the eyes, the labrum greenish or yellowish blue, angle of the frons black, dusky briefly below the angle; frons above with a well defined T-spot, 3 mm. wide in front on the angle of the frons, the stem about .85 mm. wide with the sides parallel and about .95 mm. long; on either side of the stem a yellow spot extending the full length of the stem and about .67 mm. wide; posteriorly against the eyes the frons is black, very narrowly on the sides, wider above and including all the vertex except the greenish yellow apex; the distance between the inner edges of the lateral ocelli 1.45 mm.; occiput blue, shading into brown in front, posterior margin narrowly yellow, passing on either side into the black of the rear of the head, about 1.10 mm. wide; eyes joined for about 2.55 mm.

Thorax light brown; middorsal carina black; mesepisterna each with an inferior elliptical yellow or yellowish green or blue dorsal spot, less than 2 mm. long and about .67 mm. wide; above and widely separated from this spot, just in front of the antealar ridge, is a minute spot of blue, probably discernible only in fresh or well preserved specimens; the mes- and metepisternum each with a pale blue stripe, the posterior one slightly wider than the other, both slightly constricted about midlength and both widened above along their respective wing bases; two pale spots on each wing base, the anterior one yellow, the posterior one blue; one blue spot on the mesonotum, three on the metanotum; legs black, brown at base, at least on the upper surface, and continued on that surface distally as much as half or two-thirds the length of the femora; wings hyaline; venation black; costa and stigma brown; membranule dark brown, almost black, tawny along its anterior border and base, extending posteriorly beyond the transverse crossvein of the anal triangle.

Abdominal segment 1 brown, narrowly blue at apex above and along the ventral half (spots D and L of Walker's *North American Species of Aeshna* whose terminology for abdominal

markings is used in the following description); 2 brown and light blue, MD very large, joined in the midline with its fellow and with PD; PD, AML, and PL fused and occupying all the side of the segment except the antero-dorsal quarter, with restricted brown markings as follows: a small oblique streak on either side above which is the remnant of the brown between MD and PD, and a longitudinal brown stripe as wide as and including the antero-ventral face of the auricle, this face with a small central blue spot; posterior edge of auricle and spines, black; 3–10 blue and black; 3 with the spots large, MD and PD in middorsal line separated by about the length of PD, each joined below with its respective lateral spot, the lateral spots all fused along the lower border; on 4 MD and PD separated at their nearest point by a distance slightly greater than the maximum length of PD, and each fused below with ML and PL respectively, along the ventral border AL and ML separated only by the median transverse carina and ML and PL separated by about the length of either; 5–7 with the spots somewhat reduced as compared with 4, only PD and PL fused, or, on 5, MD and ML narrowly; 8 with all the spots greatly reduced but PD and PL which are more or less fused and are slightly less in length than one-third the length of the segment; 9 similar with PD and PL, more or less fused into one spot, nearly as large as on 8 and, relative to the segment, much larger; 10 blue above, dark brown anterior to the level of the middorsal spine and in a narrow longitudinal middorsal line posterior to that spine, and along the extreme posterior border. Abdomen beneath brown from the constriction of 3 to the level of the valvules of 9, marked with a large blue spot on either side of most if not all these segments (these spots are more evanescent than the dorsal and lateral markings); each spot lies along the lateral carina, is long, low, irregularly triangular in shape with the apex directed mesad, and, if not confined to 4–7, seems to be most conspicuous on these segments; 9 posterior to the valvules and all of 10 bright sky blue. Appendages dark brown to black.

Female. As usual in the genus duller and paler than the male, yellowish or greenish tinging or replacing the blue of the male and color patterns less sharply defined, otherwise similar except as noted below. Labium less bluish, the squames paler but about the same color as the median and lateral lobes; labrum light brown; face obscure light greenish brown, bluer and clearer on the sides, frons yellowish along the eyes; yellow replacing blue on the occiput.

Dorsal thoracic spots slightly smaller than in the male, yellow; no spots above them in front of the antealar ridge; first lateral thoracic stripe yellow, the second yellowish green; the first with its upper fourth obliterated except for a small spot near the lateroalar ridge; spots on wing bases and nota yellow; legs with the basal brown slightly more extensive than in the male; wings with the base anterior to A and distal almost to the arculus, tinged tawny brown; stigma paler brown than in the male. [In considering the colors of female Aeshnas it is well to have Walker's discussion of the subject "Color variation of females" in mind (Walker, *North American Species of Aeshna,* p. 29). It is probable that it is in those species in which the males are light blue that the most distinct dimorphism may be expected. Thus the description of the female of *manni,* based on a single specimen, should be held more open to later necessary revision than would be required probably were the species one with green males like *cornigera.* In addition to body colors, and apparently independent of it, wing tinting is likely to be subject to great individual variation in females. Moreover, in the genus ontogenetic changes are great and involve every part of the body including the wings and legs.]

Abdomen with L on 1 yellowish, diffuse; 2 essentially as in the male as far as can be detected from the faded colors of the single specimen, the blue more evanescent, the pattern less sharply defined and the blue, especially in front below, reduced by encroachments of brown; 3–10 not as dark as in the male; darkening progressively throughout its length from

basal brown to apical dark brown or black; the pale color, as well as can be determined from the single specimen, is green or greenish beginning at the median transverse carina on 3 and becoming more yellowish posteriorly until the spots on 8 and 9 appear distinctly yellow; 8 with only ML, PD, and PL apparent, the two latter fused; on 9 PD and PL form a single rounded spot. Beneath only lighter and darker brown are discernible in a more or less distinct pattern; in life there are probably some brighter colors which are not preserved in dried material. Appendages black.

Both sexes have a well developed spinose tubercle on the sternum of abdominal segment 1. It is about 1.1–1.2 mm. wide and .5 mm. high. Rising gradually from about the middle of the sternum to its maximum elevation near the posterior border it descends abruptly in a convex posteriorly directed surface bearing about fifty spines or teeth of unequal sizes irregularly spaced.

The male hamular process in ventral view is about .5 mm. long, simple, flattened, without any structures to separate it from the hamular fold and with the antero-ventral mesal angle likewise undifferentiated; the hamular fold lying almost dorsad, scarcely visible in ventral view, extending from the process laterad, then bending abruptly dorsad for about .25 mm., where it again bends abruptly, extending mesad and slightly ventrad, turning almost immediately on itself to extend laterad and dorsad to the attachment of the hamule. No trace of a spinulose tubercle in the hamular fold as described and figured by Walker for North American species has been detected in either *manni* or *cornigera* but in these species the fold conceals well the area where the tubercle might be expected and it is possible dissection may reveal a tubercle we are overlooking. Anterior lamina without distinct spines. Superior appendage 6.0 mm. long and 1.25 mm. wide at its maximum width, the inferior in dorsal view two-fifths the superior; dorsal keel of the superior distinctly elevated for about the apical two-fifths of the appendage, the elevation

reaching its maximum height at about its midlength, without tubercles or teeth; the apex abruptly acute and turned ventrad.

In the female the abdominal appendages are flat, nearly horizontal with the mesal edge slightly dorsal to the lateral edge; no carina other than the edges themselves; broken in the single specimen, length of basal part present 7.0 mm., maximum width 1.8 mm., estimated length of appendage 10.0 mm. Genital valves in ventral view 2.5 mm. long, narrowly elliptical, the apices separated by about half the width of each apex, ventral surface well defined, generally smoothly convex with a short shallow median sulcus before the apex; a minute brush of hairs just anterior to the postero-ventral angle; style .8 mm. long, and shorter than the dorsum of abdominal segment 10; basal plate of ovipositor with posterior edge nearly straight; lateral plates present. Sternum of abdominal segment 10 with about 80 or 90 small spines about the same size and shape as the spines on the ventral tubercle of segment 1.

Some venational characters of the species are indicated below. Anal triangle with three cells; normally two cells between $A_2$ and $A_3$ at their origin, in two male wings, not the same individual, there was but one, but the shape of the cells below showed two was the normal number; in the front wing Rs forking proximad to the stigma from between the fourth and fifth postnodals from the stigma to between the second and third postnodals;* in the hind wing from between the fifth and sixth postnodals to between the third and fourth; three rows of cells in the fork of Rs at the level of the distal end of the stigma in both front and hind wings except one

* This conventional method of defining the position of the fork of Rs is inaccurate and misleading since the position of the postnodals is not fixed, and in two wings, representing the extremes in the above terminology, the fork of Rs might lie in identically the same relative position in the wing area. A better expression would be the ratio of the distance from the fork of Rs to the level of the proximal end of the stigma, to the distance between nodus and stigma or possibly better still the ratio of the distance from the fork of Rs to the wing tip, to the distance from wing base or nodus to the fork of Rs or to the wing tip.

hind wing of a male where there are four; three is the maximum number of cells between Rs and Rspl in all the front wings and in half the hind wings of each sex, the remaining half having four; $M_{1a}$ in front wing arising at the level of about the middle of the stigma; in the hind wing it arises at a level from the proximal end of the stigma to its middle; antenodals in the front wing 17 in four wings of males, 18 in two, and 19 and 20 in the two wings of the female; in the hind wing 9 in one wing of a male, 10 in the other wings of males, and 11 and 13 in the two wings of the female; postnodals in the front wing 10 in two wings of males, 12 in three wings of males and one wing of the female, and 13 in one wing of a male and one wing of the female; in the hind wing 13 in four wings of males, 14 in two wings of males, and 15 in the two wings of the female; cubito-anal crossveins in the front wing 6 in five wings of males and two wings of the female, and 7 in one wing of one male; in the hind wing 5 in all wings; crossveins of the supertriangles in the front wing 3 in four wings of males and the two wings of the female, and 4 in two wings of males; in the hind wing 2 in all wings; number of cells in the triangle of the front wing 5 in all wings except one wing of the female where there are 6; in the hind wing 4 in all wings except two wings of a male where there are 5; number of cells in anal loop 8 in one wing of a male, 9 in three wings of males, 12 in one wing of a male and one of the female, and 13 in one wing of a male and one of the female.

Described from three males and one female, all adult, from Los Parres and Palmarita, Baja California, Mexico; one male and one female, the type and allotype respectively, October 6, 1923, and one male, October 7, 1923, Los Parres; one male, October 8, 1923, Palmarita; J. H. Williamson; all in collection E. B. W. For notes on localities and dragonflies associated with *Aeshna manni*, see under *Telebasis incolumis*, page 6. The species is named for Dr. William Mann.

The males of *Aeshna cornigera* and *manni* are separated from all other described Aeshnas known to us by having the

following combination of characters: venation dark, stigma uniformly colored, not paling apically; fork of Rs nearly symmetrical; supertriangle with crossveins; anal triangle three-celled; stem of T-spot on frons with sides parallel, as wide or wider than the yellow spot on either side of it; fronto-nasal suture not black; legs black, paler basally and for about half the length of the femora but no sharp lines or definitions of color; abdominal segment 1 with a well-developed spinulose ventral tubercle; superior appendages in lateral or infero-lateral view without any trace of an inferior angled keel or tubercle near the base; apex of the superior appendage briefly acute and abruptly turned ventrad; the inferior appendage less than half the length of the superiors in dorsal view; the anterior lamina of abdominal segment 2 without distinctly developed spines. These characters of course are not of equal value for group defining purposes but will serve to definitely place the males of the two species with which we are here concerned. Characters given above, which are not sexual, combined with characters of the genital valves and abdominal appendages, as described on page 30 for *manni,* will probably segregate the females of the two species but more material and study are necessary to confirm this.

Both sexes of *manni* are separated at once from *cornigera* by the greatly reduced dorsal thoracic stripes which, in *cornigera,* are wide and bright green, and extend above to just below the antealar ridge, with a conspicuous spot above each stripe, resting astride the antealar ridge. In the male of *manni* the superior abdominal appendage is wider in supero-internal view than in *cornigera* with the mesal edge expanded and convex, not parallel to the outer edge; in *cornigera* the appendage is narrower and the mesal edge is concave and parallel to the outer edge for a distance equal to more than half the length of the appendage. In the female of *manni* the genital valves in ventral view are narrowly elliptical with the lateral margins of the basal third parallel or nearly so, dark brown in color shading imperceptibly into black at the apex;

in *cornigera* the valves are rhomboidal rather than elliptical with the lateral margins of the basal third divergent, part of the basal third distinctly paler than the rest of the valve. In the female of *manni* the abdominal appendages are longer and wider than in *cornigera.*

A male of what we have been calling *cornigera* was sent to Dr. Calvert who writes, "This is I believe the *cornigera* of the *B. C. A.*" We also sent a male of the same species to Dr. Ris and he reports it belongs to the same species as the *cornigera* of his "*Libellen aus der Region amerikanischen Kordilleren*" paper, though he is not quite sure that what he there considers *cornigera* is really homogeneous. So much for the identification of *Aeshna cornigera.* It should be noted that figure 42, page 46, Martin's "*Coll. de Selys Aeschines*" is not *cornigera,* as labelled, but is probably *marchali.* Other figures in this work are incorrectly labelled. We also sent a male of *manni* to Drs. Calvert and Ris. Neither had before seen the species and both believed it had not been described. Calvert, "*Odonata of Baja California,*" records *cornigera* from that Mexican state. *Cornigera* as we have identified it was not taken there by J. H. Williamson. Through Dr. Calvert's kindness we have examined the San Raymundo male recorded by him, and we believe this male is really *manni* and that *cornigera* should be dropped from the Baja California list.

PLATE I

Fig. 1, color pattern of *Erpetogomphus coluber* male; figs. 2 and 3, color patterns of *Erpetogomphus natrix,* male and female; figs. 4 and 5, abdominal appendages and first hamule, lateral views, left side, of *Erpetogomphus coluber,* type male; fig. 6, penis, lateral view, left side, of *Erpetogomphus natrix,* type male (the large roughly quadrangular base is the first segment; the second segment, as seen in the figure, is roughly cylindrical; the third is roughly triangular; and the much more complicated apical parts are the fourth segment); figs. 7 and 8, abdominal appendages and first hamule, lateral views, left side, of *Erpetogomphus natrix,* type male; fig. 9, antero-dorsal view of occiput and ocelli of *Erpetogomphus natrix,* allotype female; fig. 10, antero-dorsal view of occiput and ocelli of *Erpetogomphus coluber,* type male.

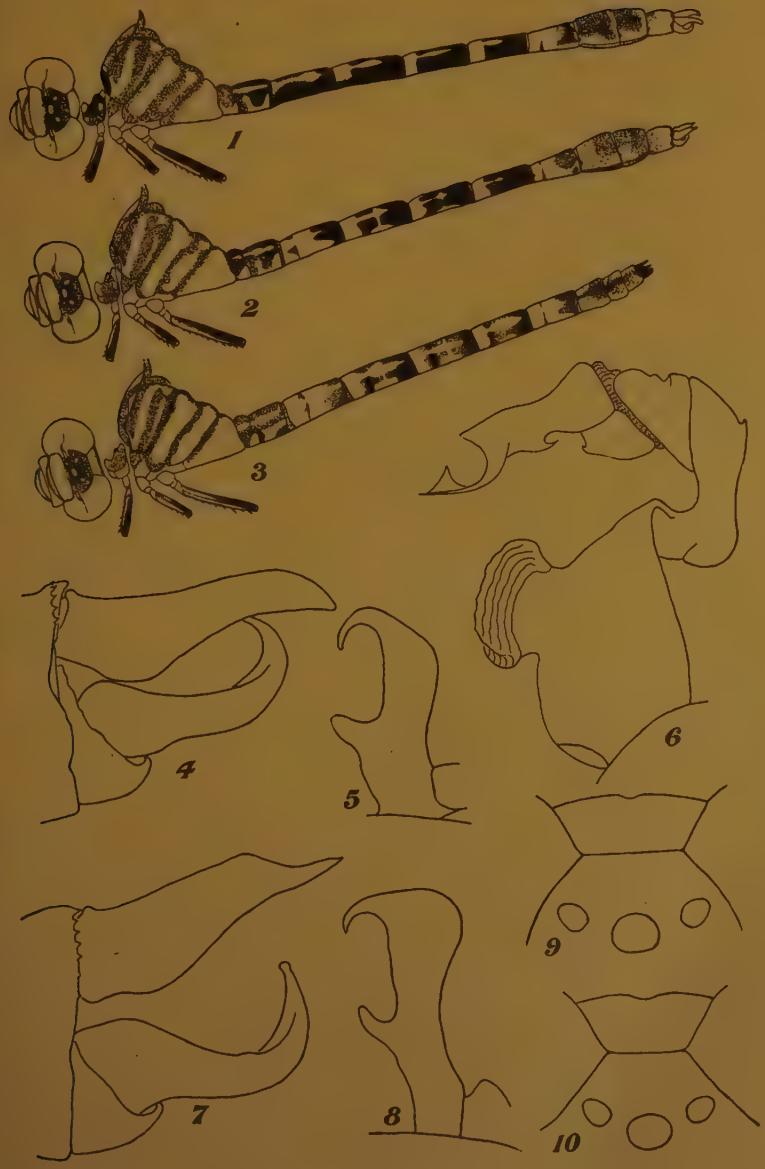
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PLATE II

Figs. 11, 12, and 13, apex of penis in ventral view, respectively, of *Erpetogomphus coluber*, type male, *Erpetogomphus compositus*, Pyramid Lake, Nevada, and *Erpetogomphus natrix*, type male; fig. 14, mesal face of left superior appendage of *Neoerythromma gladiolatum*, type male; fig. 15, sterna of segments 8 and 9 of *Erpetogomphus natrix*, allotype female; figs. 16 and 17, abdominal appendages, respectively in dorsal and lateral views, of *Neoerythromma gladiolatum*, type male; fig. 18, mesal face of left superior appendage of *Telebasis incolumis*, type male; fig. 19, dorsal view of anterior part of mesothorax and of the hind lobe of the prothorax of *Telebasis salva*, female, Acoponeta, Nayarit, Mexico (stippling at left of figure of mesothorax and on hind lobe of prothorax indicates black or nearly black in the specimen); fig. 20, abdominal appendages in lateral view of *Telebasis incolumis*, type male; fig. 21, mesal face of left superior appendage of *Telebasis salva*, male, Acoponeta, Nayarit, Mexico; fig. 22, *Telebasis incolumis* allotype, female, same explanation as for fig. 19.

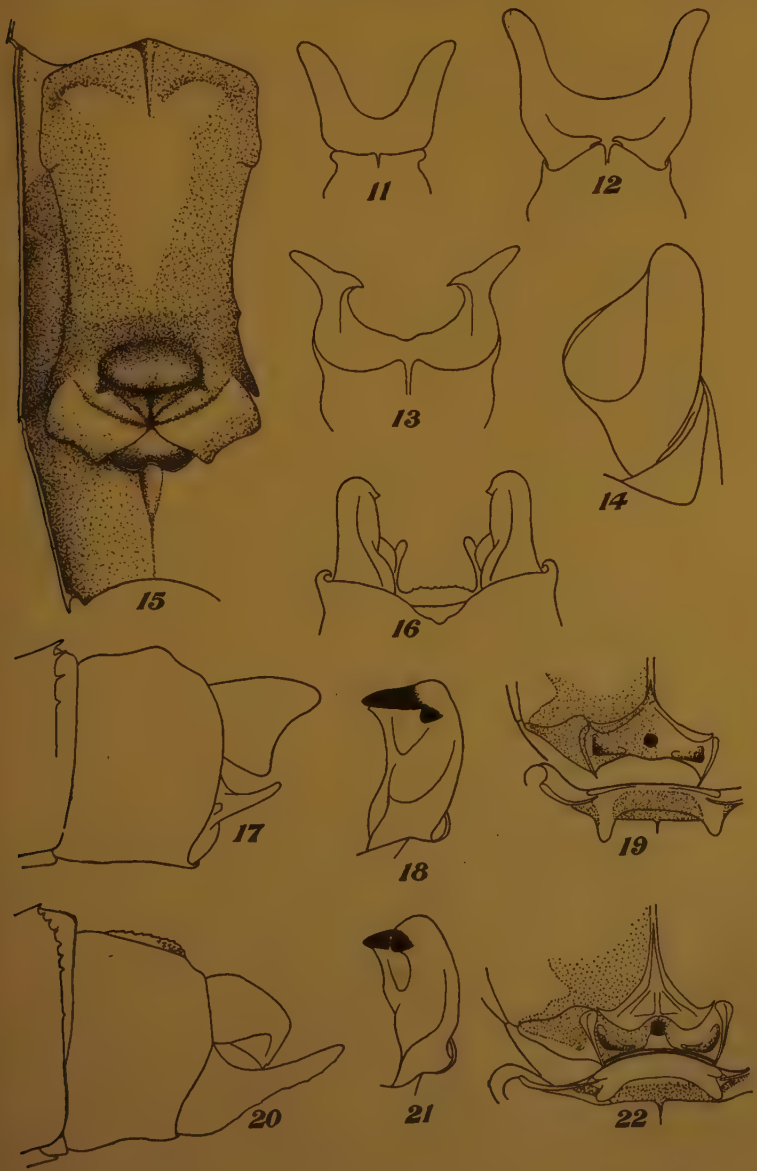
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PLATE III

All figures of *Aeshna manni*. Figs. 23 and 24, color patterns of male and female (the light stippling in fig. 24 on either side of the stem of the black T-spot of the frons represents a yellow area which should also be shown in fig. 23); fig. 25, female genitalia, lateral view, left side, allotype female; fig. 26, anterior lamina and anterior hamules, ventral view, type male; figs. 27 and 28, abdominal appendages, dorsal and lateral views, type male; fig. 29, dorsal view of the broken appendages of the allotype female.

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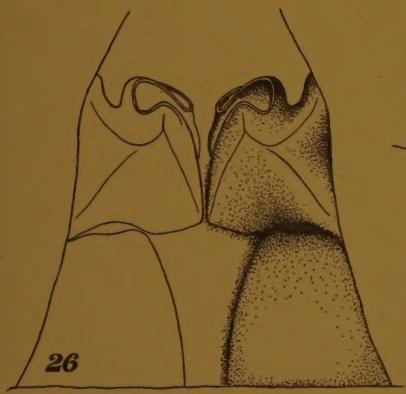
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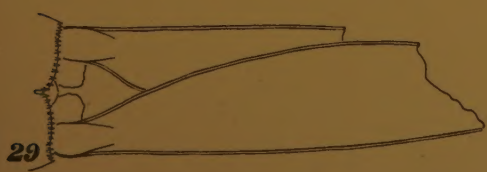
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